

REMARKS

Claims 1-32 are pending in the present patent application. Claims 18-29 are allowed. Claims 1, 7, 11-17, and 30-32 stand rejected, and claims 2-6 and 8-10 have been withdrawn from consideration. This application continues to include claims 1-32.

Claim 30 was rejected under 35 U.S.C. §102(b) as being anticipated by Umezawa, et al., U.S. Patent No. 6,276,776 B1 (hereinafter, Umezawa). Applicants respectfully request reconsideration of the rejection of claim 30 in view of the following.

Umezawa is directed to controlling the temperature of a plurality of recording heads in order to maintain recording temperature in a low-temperature environment (col. 1, lines 11-14). Umezawa discloses an ink jet printer 200 having four (4) recording heads 9A-9D (col. 5, lines 16-30, Figs. 1 and 2). 9A1 to 9D1 denote sub-heaters for heating the respective recording heads 9A to 9D, and 10A to 10D are temperature sensors for detecting temperatures of the respective recording heads 9A to 9D (col. 5, lines 53-56, Fig. 1).

The temperature of each of the recording heads 9A to 9D is controlled using four (4) pulse-width modulated (PWM) periods, one for each recording head, based on the temperature detected by temperature sensors 10A to 10D, and the pulses are repeatedly provided until the recording heads reach the desired temperature (col. 6, lines 33-57, Fig. 3). The recording operation is then started after reaching the optimum recording temperature (col. 7, lines 9-12).

Applicants believe that claim 30 patentably defines Applicants' invention over Umezawa, for at least the reasons set forth below.

Claim 30 is directed to a method for providing a plurality of fire pulses in an ink jet printer, comprising the step of producing a plurality of fire signals specific to a particular color, each fire signal of said plurality of fire signals being asserted at a different timing than other of

said plurality of fire signals and wherein each fire signal of the plurality of fire signals is used to separately address a respective corresponding group of nozzles on a printhead.

In contrast to claim 30, Umezawa discloses that the temperature of each of the recording heads 9A to 9D is controlled using four (4) pulse-width modulated (PWM) periods, one for each recording head, based on the temperature detected by temperature sensors 10A to 10D for the respective recording heads 9A to 9D, and the pulses are repeatedly provided until the recording heads reach the desired temperature (col. 5, lines 53-56, col. 6, lines 33-48, Fig. 3).

In addition, since the present embodiment has four recording heads, the drive period is divided into four PWM periods (col. 6, lines 48-51).

Thus, Umezawa discloses a single drive period that is divided into four (4) pulse-width modulated periods. However, the four pulse-width modulated periods disclosed by Umezawa do not separately address a respective corresponding group of nozzles on a printhead, as recited in claim 30, which refers to a single printhead, that is, one printhead.

Rather, Umezawa discloses that the four pulse-width modulated periods are used for four printheads, that is, one for each printhead. For example, Umezawa Fig. 3 clearly shows that four signals are applied in one-to-one correspondence to four printheads, being the first, second, third, and fourth printheads, wherein each printhead receives only one of the signals.

Applicants respectfully submit that a drive period divided into four PWM periods applied in one-to-one correspondence with of four printheads, wherein each printhead receives only one of the signals, does not disclose, teach, or suggest producing a plurality of fire signals specific to a particular color, each fire signal of the plurality of fire signals being asserted at a different timing than other of the plurality of fire signals and wherein each fire signal of the plurality of fire signals

is used to separately address a respective corresponding group of nozzles on a printhead, as recited in claim 30, at least because only one Umezawa signal is applied to each printhead.

Accordingly, Umezawa does not disclose, teach, or suggest wherein each fire signal of the plurality of fire signals is used to separately address a respective corresponding group of nozzles on a printhead, as recited in claim 30.

Accordingly, for at least the reasons set forth above, Applicants believe that claim 30 is in condition for allowance in its present form, and thus respectfully request that the rejection of claim 30 under 35 U.S.C. 102(b) be withdrawn.

Claims 1, 7, 11-17, and 30-32 were rejected under 35 U.S.C. §103(a) as being unpatentable over the third embodiment associated with Figs. 7 and 8 of Kao, et al., U.S. Patent Application Publication No. 2002/0018086 A1 (hereinafter, Kao) in view of the fourth embodiment associated with Figs. 9 and 10 of Kao. Applicants respectfully request reconsideration of the rejection of claims 1, 7, 11-17, and 30-32 in view of the following.

Kao is directed to a driving circuit of an ink jet print head (page 1, paragraph 2). Kao discloses a third embodiment, wherein a first driving signal 335 and a second driving signal 338 supply energy to ink jet cells. The first driving signal 335 provides energy sufficient to eject ink, whereas the second driving signal 338 does not (page 3, paragraph 0032, Fig. 8).

In a fourth embodiment, Kao discloses a first heating pulse 435, which is a preheating pulse that preheats all ink jet cells regardless of whether they will eject ink or not. The first heating pulse 435 is less than the threshold at which ink is ejected. The ink jet cells that are intended to eject ink receive a second heating pulse 438, and the total received energy exceeds the threshold, so that the nozzles eject ink (page 4, paragraph 34, Fig. 10).

Applicants believe that claims 1, 7, 11-17, and 30-32 patentably define Applicants' invention over Kao, for at least the reasons set forth below.

Claim 1 is directed to a method for providing a plurality of fire pulses in an ink jet printer.

Claim 1 recites, in part, producing a plurality of fire signals, each fire signal of said plurality of fire signals being asserted at a different timing than other of said plurality of fire signals and wherein each fire signal of the plurality of fire signals is used to separately address a respective corresponding group of nozzles.

The Kao third embodiment does not disclose, teach, or suggest each fire signal of the plurality of fire signals being asserted at a different timing than other of the plurality of fire signals, as acknowledged by the Examiner.

For example, the Kao first driving signal and second driving signal are both asserted at the same timing, as illustrated in Kao Fig. 8.

Claim 1 also recites, in part, combining said plurality of fire signals to form a composite fire signal that maintains said different timing.

The Kao third embodiment does not disclose, teach, or suggest combining the plurality of fire signals to form a composite fire signal that maintains the different timing, as acknowledged by the Examiner.

Rather, the Kao third embodiment discloses applying either the first driving signal or the second driving signal, for example, as illustrated in Kao Fig. 8.

In addition, the Kao fourth embodiment does not disclose, teach, or suggest wherein each fire signal of the plurality of fire signals is used to separately address a respective corresponding group of nozzles, since, for example, as shown in Fig. 10, the first heating pulse is provided to

each of R1-R4 and C1-C4, and hence, is applied to all nozzles. Also, Kao explicitly discloses that the first heating pulse preheats all ink jet cells regardless of whether they will eject ink or not (lines 3-6 of paragraph 0034). Since the Kao first heating pulse addresses all nozzles, including the nozzles that receive the Kao second heating pulse, it clearly does not separately address a corresponding group of nozzles.

Further, it would not be obvious to combine the Kao third and fourth embodiments in an effort to yield Applicants' invention of claim 1. Even if combined, the Kao third and fourth embodiments would not achieve Applicants' invention of claim 1.

For example, the Kao third embodiment does not combine a plurality of driving signals to form a composite fire signal that maintains the different timing, as acknowledged by the Examiner, but rather, the Kao third embodiment discloses applying either the first driving signal or the second driving signal, for example, as illustrated in Kao Fig. 8.

Thus, even if the first and second heating pulses of the embodiment of Fig. 10 were applied to the Kao third embodiment, the resultant combination would not combine those signals to form a composite fire signal.

Even assuming, arguendo, that the resultant signals were combined, the combination would still not yield the invention of claim 1. For example, since the Kao first heating pulse of claim 10 is applied to all ink jet cells, as explicitly disclosed by Kao (lines 3-6 of paragraph 0034), the resultant combination would not disclose, teach, or suggest wherein each fire signal of the plurality of fire signals is used to separately address a respective corresponding group of nozzles.

Still further, MPEP 2144 provides that the strongest rationale for combining references is a recognition, expressly or impliedly in the prior art or drawn from a convincing line of reasoning

based on established scientific principles or legal precedent, that some advantage or expected beneficial result would have been produced by their combination. *In re Sernaker*, 702 F.2d 989, 994-95, 217 USPQ 1, 5-6 (Fed. Cir. 1983).

However, there has been no showing that some advantage or expected beneficial result would have been produced by combining the third and fourth Kao embodiments.

Also, the asserted combination is not supported by any rationale that fits within the legal precedents as sources of supporting rationale set forth in MPEP 2144.04 (I) to (VII).

Accordingly for at least the reasons set forth above, Kao does not disclose, teach, or suggest the subject matter of claim 1, and it would not be obvious to combine the third and fourth embodiments of Kao in an attempt to yield the subject matter of claim 1. Further, even if combined, the third and fourth Kao embodiments would not achieve the invention of claim 1.

Claim 1 is thus believed allowable in its present form.

Claim 7 is directed to an ink jet printer. Claim 7 recites, in part, a controller communicatively coupled to said printhead carrier for producing a plurality of fire signals, each fire signal of said plurality of fire signals being asserted at a different timing than other of said plurality of fire signals, said controller combining said plurality of fire signals to form a composite fire signal that maintains said different timing, and wherein each fire signal of said plurality of fire signals is used to separately address a respective corresponding group of nozzles.

Kao does not disclose, teach, or suggest the subject matter recited in claim 7 for substantially the same reasons as set forth above with respect to claim 1.

Claims 11-17 are believed allowable due to their dependence, directly or indirectly, on otherwise allowable base claim 7. In addition, claims 11-17 further and patentably define the invention over Kao.

For example, claim 11 is directed to the ink jet printer of claim 7, wherein said controller forms a plurality of composite fire signals, each including a corresponding plurality of fire signals.

In contrast, the asserted Kao signals, assuming arguendo that they are combined to form a composite fire signal, would form only a single composite fire signal, which does not disclose, teach, or suggest a plurality of composite fire signals.

Accordingly, claim 11 is believed allowable in its own right.

Claim 12 is directed to the ink jet printer of claim 11, wherein said plurality of composite fire signals is associated with a plurality of ink colors.

Kao simply does not disclose, teach, or suggest a plurality of colors. For example, the entire Kao disclosure does not include the word, “color.” Further, Kao does not in any manner disclose, teach, or suggest that the ink jet cells or the driving signals and heating pulses are associated with a plurality of colors.

Accordingly, claim 12 is believed allowable in its own right.

Claim 13 is directed to an ink jet printer of claim 7, wherein each of said plurality of fire signals includes a prefire signal and mainfire signal.

In contrast to claim 13, in each of the relied-upon embodiments, Kao discloses two signals, one which ejects ink, and the other, which does not eject ink. Thus, each of the asserted Kao fire signals includes only one signal, not a prefire signal and a mainfire signal, as recited in claim 13.

Also, since it is the plurality of fire signals that is combined to form the composite fire signal, as recited claim 7, it is clear that the composite fire signal formed by the plurality of fire signals of claim 13 must have at least two mainfire signals and two prefire signals, for a minimum

of four (4) signals. Since the asserted Kao composite fire signal has only two pulses, it is clear that Kao does not disclose, teach, or suggest the subject matter recited in claim 13.

Accordingly, claim 13 is believed allowable in its own right.

Claim 16 is directed to the ink jet printer of claim 7, wherein said plurality of fire signals is specific to a particular color.

Implicit in the phrase, “specific to a particular color,” is that there is more than one color available in the ink jet printer. With any other interpretation, such term is rendered meaningless.

In addition, the claims should be construed in light of the specification. In the present case, Applicants’ specification clearly provides multiple colors, for example, as set forth at page 7, lines 1-12, wherein there are three colors, C0, C1 and C2, e.g., cyan, magenta, and yellow, and wherein each of the plurality of fire signal is specific to a particular one of the C0, C1 and C2 colors.

However, Kao simply does not disclose, teach, or suggest any fire signals that are specific to a particular color. For example, the entire Kao disclosure does not include the word, “color.” Further, Kao does not in any manner disclose, teach, or suggest that the ink jet cells or the driving signals and heating pulses are specific to a particular color. Rather, the Kao driving signals are unrelated to any particular color.

Accordingly, claim 16 is believed allowable in its own right.

Claim 17 is directed to the ink jet printer of claim 16, wherein said composite fire signal is specific to said particular color.

Claim 17 is believed allowable in its own right for substantially the same reasons as set forth above with respect to claim 16.

Claim 30 is directed to a method for providing a plurality of fire pulses in an ink jet printer, comprising the step of producing a plurality of fire signals specific to a particular color, each fire signal of said plurality of fire signals being asserted at a different timing than other of said plurality of fire signals and wherein each fire signal of the plurality of fire signals is used to separately address a respective corresponding group of nozzles on a printhead.

Claim 30 is believed allowable in its present form for substantially the same reasons as set forth above with respect to claims 1 and 16.

Claims 31 and 32 are believed allowable due to their dependence, directly or indirectly, on otherwise allowable base claim 32. In addition, claims 31 and 32 further and patentably define the invention over Kao.

For example, claim 32 is directed to the method of claim 31, wherein said composite fire signal is specific to a particular color.

Claim 32 is believed allowable in its own right for substantially the same reasons as set forth above with respect to claim 16.

Accordingly, for at least the reasons set forth above, Applicants respectfully submit that Kao does not disclose, teach, or suggest the subject matter of claims 1, 7, 11-17 and 30-32, and thus respectfully request that the rejection of claims 1, 7, 11-17 and 30-32 under 35 USC 103(a) be withdrawn.

For the foregoing reasons, Applicants submit that no combination of the cited references teaches, discloses or suggests the subject matter of the pending claims. The pending claims are therefore in condition for allowance, and Applicants respectfully request withdrawal of all rejections and allowance of the claims.

In the event Applicants have overlooked the need for an extension of time, an additional extension of time, payment of fee, or additional payment of fee, Applicants hereby conditionally petition therefor and authorize that any charges be made to Deposit Account No. 20-0095, TAYLOR & AUST, P.C.

Should any question concerning any of the foregoing arise, the Examiner is invited to telephone the undersigned at (317) 894-0801.

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